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|---|--|-------------------------------|-----------------------|
| Brookhaven National Laboratory National Synchrotron Light Source | | Number: LS-PPS-0032 | Revision: B |
| | | Effective: 8/12//03 | Page 1 of 7 |
| Subject: <u>X17B2</u> Radiological Interlock Test | | | |
| Prepared/ Approved By: M. Buckley | Prepared/ Approved By: S.Buda | | |

*Approval signatures on file with master copy.

[Revision/Periodic Review Log](#)

| | | |
|--------------|--|--------------|
| Test Reason: | Test Result: <input type="checkbox"/> Passed <input type="checkbox"/> Failed | |
| | Test Type: <input type="checkbox"/> Full <input type="checkbox"/> Partial | |
| Test Date: | Start Time: | Finish Time: |
| Tester 1: | Assistant 1: | |
| Tester 2: | Assistant 2: | |

PREPARATION:

Inform control room operator that test will be done.

Turn off 'Red Tag' switch on x-ray ring interlock, and apply LOTO to X-Ray Security system.

Verify that vacuum valves and water interlocks are satisfied on X17B1.

Verify all hutch door thresholds are in place.

Verify that the B2 backstop is closed in the "In-Beam" position.

1. Press CS-1

The overhead lights go out

The red interior light comes on

Press CS-2, close hutch door, and Press CS-E

The audible alarm sounds for 13 to 15 seconds minimum

The hutch interlock sign turns on

2. Open hutch door

The hutch interlock sign goes out

3. Press second check station, CS-2

Pilot light does not stay ON

Press CS-1

Pilot light does come ON

Close door, then Press CS-E

Interlock does not activate.

4. Press second Check station, CS-2

Pilot light does not stay ON

Exit hutch, close door, and press CS-E

Interlock does not activate.

5. Press CS-1, Press CS-2, close hutch door and wait.

Hutch interior lights come on in not more than 50 seconds

Press CS-E.

Interlock does not activate

| X17B2 Radiological Interlock Test | | | |
|--|--------------------|---------------------------|--------------------|
| Number: LS-PPS-0032 | Revision: B | Effective: 8/12/03 | Page 2 of 7 |

6. Press interior search buttons, close door, press CS-E, note that alarm comes on, open and close door, press CS-E again. (This must all be done in less than the timeout interval noted in step 5).

Interlock does not activate _____

7. Switch Direct Beam Stop (DBS) to "**White**" Mode.
Secure Transport Hutch and 17B3 hutch. Lower the X17B1 Beam Backstop in the OPEN position and secure X17B1 hutch. Secure X17B2 hutch, one person remains inside.

The Small Transport Enclosure Safety Shutter (STRESS)
"enable" light does not come on until the end of the
warning interval. _____

8. The person inside presses an Emergency Stop Button.

| ES1 | ES2 | ES3 |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

The shutter "enable" light goes out

The ES indicator comes on

The ES latch cannot be reset unless the SOR key is turned

Repeat step 8 for each ES button.

9. Place latch devices on X17B2 hutch door locks so key can be removed. Place switch holders on door switches. Switch the Shutter Control Switch to X17B2 (located at X17B1 control panel). Secure hutch, put door key in SRU and turn, and open STRESS and Beamline Safety Shutter (BLISS).

Verify BLISS opens before STRESS

The "Beam ON" signs turns ON _____

| Door: | | |
|--------------|---|---|
| 1 | 2 | 3 |

Remove holder from switch 2.

RIB latch light comes ON _____

Replace holder on switch 2.

RIB cannot be reset unless SOR key is turned. _____

10. Remove holder on switch 1.

STRESS closes

Verify STRESS closes 1st and then the BLISS

BLISS closes

RIA latch light comes on

Hutch interlock drops out

"Beam On" sign is OFF

RIA can't be reset w/o SOR _____

11. Secure the B2 hutch and leave shutters closed.

Hutch Kirk key (KKH) cannot be removed from SRU
unless button is pushed _____

12. Open STRESS.

KKH cannot be removed even if button is pushed _____

| X17B2 Radiological Interlock Test | | | |
|--|--------------------|---------------------------|--------------------|
| Number: LS-PPS-0032 | Revision: B | Effective: 8/12/03 | Page 3 of 7 |

13. *B2 Hutch Access w/B2 Backstop Open:*
Secure the B2 & B3 hutch and leave B2 Backstop closed.
B2 Hutch Kirk key (KKH) cannot be removed from SRU
unless button is pushed _____
Open B2 Backstop _____
B2 KKH cannot be removed even if button is pushed _____
Close B2 Backstop
Break security in B2 hutch.
Attempt to Open B2 Backstop.
B2 Backstop will not Open. _____
Break security in B3 hutch. _____
14. Close shutters. Turn KKH and note where solenoid unit stops rotation. Push the button and turn key just beyond this point, but not far enough to actuate "key removed" switch. Release the button and leave key in this position. Open shutters, remove KKH, and replace.
RIA latch light comes on _____
RIB latch light comes on _____
The STRESS closes _____
The BLISS closes _____
Reset RIA & RIB and replace KKH in SRU. _____
15. Beam line lockout key can be removed only if button on SRU is pushed _____
Open STRESS _____
Beam line lockout key can't be removed even if button is pushed _____
16. Close STRESS, cheat BLKK SRU, and open STRESS (BLISS Opens automatically). Remove B/L lockout key, and replace.
RIA trips _____
RIB trips _____
STRESS closes _____
BLISS closes _____
SPA comes on when key is replaced _____
SPA can't be reset w/o SOR _____
17. Open STRESS, and press an emergency stop button.
RIA latch light comes on _____
RIB latch light comes on _____
Hutch interlock drops out _____
STRESS closes _____
BLISS closes _____
Reset RIA, RIB, and ES. Secure B2 hutch. _____

| X17B2 Radiological Interlock Test | | | |
|--|--------------------|---------------------------|--------------------|
| Number: LS-PPS-0032 | Revision: B | Effective: 8/12/03 | Page 4 of 7 |

18. Open STRESS 'B' by pressing and holding the button on the air solenoid. The BLISS remains closed.

Remove holder on switch 2 and replace.

RIB trips

Reset RIB, release switch 1

RIA trips

Close STRESS by releasing solenoid button, and Reset RIA.

19. Secure hatch. Turn off air to STRESS on solenoid bank, cycle shutter open & closed until it remains closed when open button is pressed.

Open BLISS and release switch 2.

RIB trips

Reset RIB, release switch 1

RIA trips

BLISS closes

Open air valve to solenoid bank.

20. Switch DBS to **MONO** mode. Secure hatch. Open STRESS and BLISS.

| Door: | | |
|--------------|----------|----------|
| 1 | 2 | 3 |

Remove holder from switch 2.

RIB latch light comes ON

Replace holder on switch 2.

RIB cannot be reset unless SOR key is turned.

21. Remove holder on switch 1.

STRESS closes

BLISS closes

RIA latch light comes on

Hutch interlock drops out

"Beam On" sign goes out

RIA can't be reset w/o SOR

Secure hatch.

22. Cheat hatch SRU, Open STRESS and BLISS.

Remove hatch Kirk key

RIA trips

RIB trips

STRESS closes

BLISS closes

Replace key and reset RIA & RIB.

23. Open STRESS and BLISS. Press an Emergency Stop

RIA trips

RIB trips

STRESS closes

BLISS closes

Reset RIA, RIB, and ES.

| X17B2 Radiological Interlock Test | | | |
|--|--------------------|---------------------------|--------------------|
| Number: LS-PPS-0032 | Revision: B | Effective: 8/12/03 | Page 5 of 7 |

24. Secure hutch.

| | | |
|-----------------------|--|-------|
| | Beam line lockout key can be removed only if button on SRU is pushed | _____ |
| Open STRESS and BLISS | Beam line lockout key can't be removed even if button is pushed | _____ |

25. Close STRESS and cheat B/L SRU. Open STRESS and BLISS. Remove B/L lockout key, and replace.

| | |
|-----------------------------------|-------|
| RIA trips | _____ |
| RIB trips | _____ |
| STRESS closes | _____ |
| BLISS closes | _____ |
| SPA comes on when key is replaced | _____ |
| SPA can't be reset w/o SOR | _____ |

26. ▪ Place switch holders on transport hutch door switches and latch device on door. Search transport hutch.
- Break security in B1 hutch, remove switch holders, and leave B1 hutch door open.
- Unplug DBS solenoid jumper cable from interface box. Attach DBS jumper power cable to the solenoid cable.
- Open STRESS; BLISS remains closed. Plug the other side of the DBS jumper power cable into an AC outlet.

| | |
|--|-------|
| DBS Opens ("White" indicator comes ON) | _____ |
| RIA trips | _____ |
| RIB trips | _____ |
| STRESS closes | _____ |

27. Open the STRESS. Remove the Control Room Shutter Enable Key for X17B1, and then replace the key.

| | |
|---|-------|
| STRESS closes | _____ |
| RIA trips | _____ |
| The "Control Room Inhibit" light comes on | _____ |
| The SPA latch comes on (after the key is back on) | _____ |
| STRESS cannot be opened | _____ |

Reset RIA and SPA at B2 and B3.

| X17B2 Radiological Interlock Test | | | |
|--|--------------------|---------------------------|--------------------|
| Number: LS-PPS-0032 | Revision: B | Effective: 8/12/03 | Page 6 of 7 |

- | | | <u>Mono</u> | <u>White</u> |
|-----|---|---|---|
| 28. | Complete steps 26 - 30 for both " <u>White</u> " and " <u>MONO</u> " DBS modes. One person goes to the x-ray equipment area and observes the indicators for RIAX and RIBX. Open STRESS and BLISS. Remove switch holder from door switch number 2. RIB latch light comes on RIBX trips Replace switch holder. Attempt to reset RIBX. RIBX will not reset Reset RIB. RIBX resets | _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ |
| 29. | Remove holder from door switch 1. RIA latch light comes on RIAX trips Attempt to reset RIAX RIAX will not reset Reset RIA RIAX resets | _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ |
| 30. | Break security in X17B2 hatch. Reset RIA and RIB. Unlock X17B1 backstop and lower enough to put latch device on backstop lock and return key to SRU. Place switch holders on both backstop upper limit switches. Open BLISS & STRESS. One person reports to the X-Ray Security Panel (SR100) and clears all faults on panel. | | |
| | | <u>Mono</u> | <u>White</u> |
| | Release left switch holder RIB latch comes ON RIBX trips Replace left switch holder. Reset RIB & RIBX. Release right switch holder. RIA latch comes ON RIAX trips Replace right switch holder Reset RIA and RIAX and close shutters Secure B2 hatch, insert hatch keys in SRU and Turn clockwise into place. Open BLISS and STRESS. Release right switch holder. The B2 hatch KK cannot be removed even if button is pushed. Replace right switch holder The B2 hatch KK can be removed only if button is pushed. | _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ |
| 31. | Remove switch holders from backstop switches. Remove latch device from backstop lock, using key from SRU. Move backstop to in-beam-position, then back out. Both limit switches operate freely and each makes a "click" when stop is moved from the in-beam position. | _____ | _____ |

| X17B2 Radiological Interlock Test | | | |
|--|--------------------|---------------------------|--------------------|
| Number: LS-PPS-0032 | Revision: B | Effective: 8/12/03 | Page 7 of 7 |

32. Open the STRESS.

Turn "Auto Open" key to "ON".

At the Control Room Operator's Console, switch the shutter master enable to "Inhibit" and back to "Enable".

The STRESS closes

And then re-opens

Turn "Auto Open" key to "OFF".

Switch the master enable to "Inhibit" and back to "Enable"

The STRESS closes

And does not re-open

33. With Shutter Selection Switch on the X17B2 position, do the following:

Mono

White

Open STRESS at X17B2

Attempt to Close STRESS at X17B1

STRESS Closes

Attempt to Open STRESS at X17B1

STRESS does not Open

Open STRESS at X17B2

Attempt to Close STRESS at X17B3

STRESS Closes

Attempt to Open STRESS at X17B3

STRESS does not Open

34. Open STRESS & BLISS. Shut off water-cooling to the B2 Backstop (Close supply water valve).

Mono

White

STRESS Closes

BLISS Closes

X17B2 enable light goes out

Open Supply water valve and Reset X17B2 water interlock fault.

35. Remove the holders from the X17B1/B2 hutch door switches. Remove the latch device from the X17B1/B2 hutch door locks. Stand inside the hutch and open and close the door.

All door switches operate freely and each "clicks" when

door is opened

X17B2:

X17B1:

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